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Agency Property

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(54) Cutting insert

The invention pertains to a cutting insert designed as a reversible carbide tip for a tool having a recess placed on a face, with contact surfaces that run at an angle to each other, a support plate, and a clamping device. In order to allow these known cutting inserts to be used for cutting threads, it is suggested that placed on a segment of each of two contact sides near a corner in the standardized plan view is a thread cutting tooth which projects beyond the plan view of the support plate which lies under it.

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Kaiser-Friedrich-Ring 70  
D-4000 DUSSELDORF 11

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Our ref.: 23 091

Date: February 11, 1982

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C l a i m s :

1. Cutting insert designed as a reversible carbide tip for a tool having a recess placed on a face, with contact surfaces that run at an angle to each other, a support plate, and a clamping device,  
c h a r a c t e r i z e d i n t h a t  
placed on a segment of each of two contact sides (19, 20) near a corner in the standardized plan view is a thread-cutting tooth (21, 22) , and that each thread cutting tooth (21, 22) projects beyond the plan view of the support plate (7) which lies under it.
2. Cutting insert according to claim 1, characterized in that a profile runout (23, 24) is placed on both sides of each thread-cutting tooth (21, 22).
3. Cutting insert according to claims 1 and 2, characterized in that chip breakers (25) are let into the areas on both sides of each thread-cutting tooth (21, 22).

ST/dg

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### Cutting Insert

The invention relates to a cutting insert that is designed as a reversible carbide tip for a tool having a recess placed on a face, with contact surfaces that run at an angle to each other, a support plate, and a clamping device

A steel tool holder with a clamping device for cutting inserts that are designed as reversible carbide tips is described as, among other things, a tool in Unexamined Patent Application DE 30 21 355. The known cutting inserts for steel tool holders of this type can have various standardized plan views, which also includes rhombs with different angles. Such cutting inserts are used for chip-cutting machining of workpieces.

Starting therefrom, the invention is based on the p r o b l e m of making the known cutting inserts, using the known tools and clamping devices, usable for the cutting of thread profiles as well, without thereby exceeding the standardized dimensions.

As the technical s o l u t i o n to this problem, it is suggested that using cutting inserts with a standardized rhombic plan view, a thread-cutting tooth that protrudes beyond the plan view of the support plate lying under it is placed on a segment of two contact sides near a corner within the standardized plan view.

In a practical embodiment, a profile runout having a depth that is dimensioned in accordance with the height of the thread profile to be cut can be placed between each thread-cutting tooth and the rest of the contact side. In addition, it has also proven expedient to provide chip breakers in the surface of the cutting insert on both sides of each thread-cutting tooth for improved chip clearing.

A cutting insert with two thread-cutting teeth designed in accordance with this technical teaching can also be designed as a reversible carbide tip, and then possesses a total of four cutters. Moreover, it is easily possible to design the cutting inserts for right- and left-hand threads and, in combination with suitably formed tools, to use them for cutting inside and outside threads. However, the outstanding advantage of a cutting insert designed according to the invention consists in the fact that it can be used in combination with known tools and clamping devices.

Further details, features and advantages of the object of the invention can be found in the following description of the associated drawings, in which preferred embodiments have been represented in plan views and detail views. The following are shown in the drawings:

Fig. 1                      in plan view, a steel tool holder for cutting outside threads, and specifically, a for left-hand threads and b for right-hand threads;

Fig. 2                      in plan view, a steel tool holder for cutting inside threads, and specifically, a for left-hand threads and b for right-hand threads;

Fig. 3                      an enlarged detail from Fig. 1b;

Fig. 4                      the same detail cut along the line IV–IV in Fig. 3.

In a steel tool holder 1 shown in one of the Figs. 1b, 3 and 4, a recess 2 with contact surfaces 3 and 4 that run at an angle to each other for a cutting insert 5 is placed at the front face. The cutting insert 5 possesses a central bore 6 and, in the embodiment shown, has a rhombic shape in plan view.

Placed under the cutting insert 5 is a support plate 7, which is somewhat smaller in plan view but still rhombic in shape, with a central bore 8. Placed in the mid-plane in the central bore 8 of the support plate 7 is a projection 9 with a trapezoidal cross section.

Engaging on the central bores 6 and 8 of the cutting insert 5 and the support plate 7 is a clamping bolt 10, which engages with a cylindrical clamping head 11 into the central bore 6 of the cutting insert 5, and with a threaded base 12 into a threaded bore 13 of the steel tool holder 1. A recess 14 with contact surfaces for an Allen key is provided both in the clamping head 11 and in the threaded base 12 of the clamping bolt 10.

In the region of the support plate 7, the clamping bolt 10 is provided with a collar 15 having an outside diameter that is somewhat greater than the inside diameter of the projection 9. On its underside facing the projection 9, the collar 15 is provided with an angled surface 16 that runs

parallel to the axially oriented side surfaces of the projection 9.

Provided in the steel tool holder 1 as a transition between the projection 9 and the threaded bore 13 is a cone 17, the inside of which lies with a spherical body 18 against the clamping bolt 10.

The cutting insert 5 possesses on each of two contact sides 19 and 20 near a corner a thread-cutting tooth 21, 22, which has been milled in full section into the standardized rhombic plan view. Created on the contact sides 19, 21 as a result of this are profile runouts 23, 24 in which regions the cutting insert 5 no longer lies against contact surface 3. However, the remaining portions of the contact sides 19, 20 for contact against the steel tool holder 1 are still enough to ensure secure clamping.

Also let into the surface of the cutting insert 5 along with the profile runouts 23, 24 are chip breakers 25 to improve chip clearing.

Using the illustrated clamping device, the cutting insert 5 designed for cutting threads is fastened to the steel tool holder 1 as follows:

After the cutting insert 5 has been mounted on the clamping head 11 of the clamping bolt 10, the latter is screwed into the threaded bore 13 by means of an Allen key. The spherical body 18 of the clamping bolt 10 thereby moves against the cone 17 in the steel tool holder 1 and in the support tooth 22. The fits between the inside thread in the threaded bore 13 and the outside

thread on the threaded base 12 are chosen in such a way that the longitudinal axis of the clamping bolt 10 can be moved by a tilt angle  $\alpha$  on a very pointed cone envelope. In addition, the longitudinal axis of the cone 17 is offset slightly inward of the longitudinal axis of the threaded bore 13, so that the spherical body 18 of the clamping bolt 10 only comes into contact with the cone 17 on one side, while on the other side it has a little play relative to the cone 17.

A maximum axial clamping distance  $x$  is available between the collar 15 on the clamping bolt 10 and the projection 9 in the central bore 8 of the support plate 7.

As a result of the arrangement and design of the clamping device described above, when the clamping bolt 10 is screwed into the threaded bore 13, the clamping head 11 is moved by a smaller radial clamping distance  $y$  and presses the cutting insert 5 into the recess 2. It can easily be seen that reliable clamping of the cutting insert 5 can be obtained only as long as the maximum axial clamping distance  $x$  between the collar 15 and the projection 9 is not exhausted. For that reason, it is very important that wear in the clamping region between the spherical body 18 of the clamping bolt 10 and the cone 17 is kept as small as possible.

As soon as the clamping bolt 10 is screwed only a little from the threaded bore 13, the cutting insert 5 comes free again and can be removed, turned, reversed or replaced. To turn or reverse the support plate 7, it is necessary to completely remove the clamping bolt 10 from the threaded bore 13.

List of Reference Symbols:

1	Steel tool holder
2	Recess
3	Contact surface
4	Contact surface
5	Cutting insert
6	Central bore
7	Support plate
8	Central bore
9	Projection
10	Clamping bolt
11	Clamping head
12	Threaded base
13	Threaded bore
14	Recess
15	Collar
16	Angled surface
17	Cone
18	Spherical body
19	Contact side
20	Contact side
21	Thread-cutting tooth
22	Thread-cutting tooth
23	Profile runout
24	Profile runout
25	Chip breaker
$\alpha$	Tilt angle
x	Clamping distance
y	Clamping distance

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Fig. 1

*[ Figures 1 – 4 do not require translation. ]*